

Figure 1: overall image analysis method

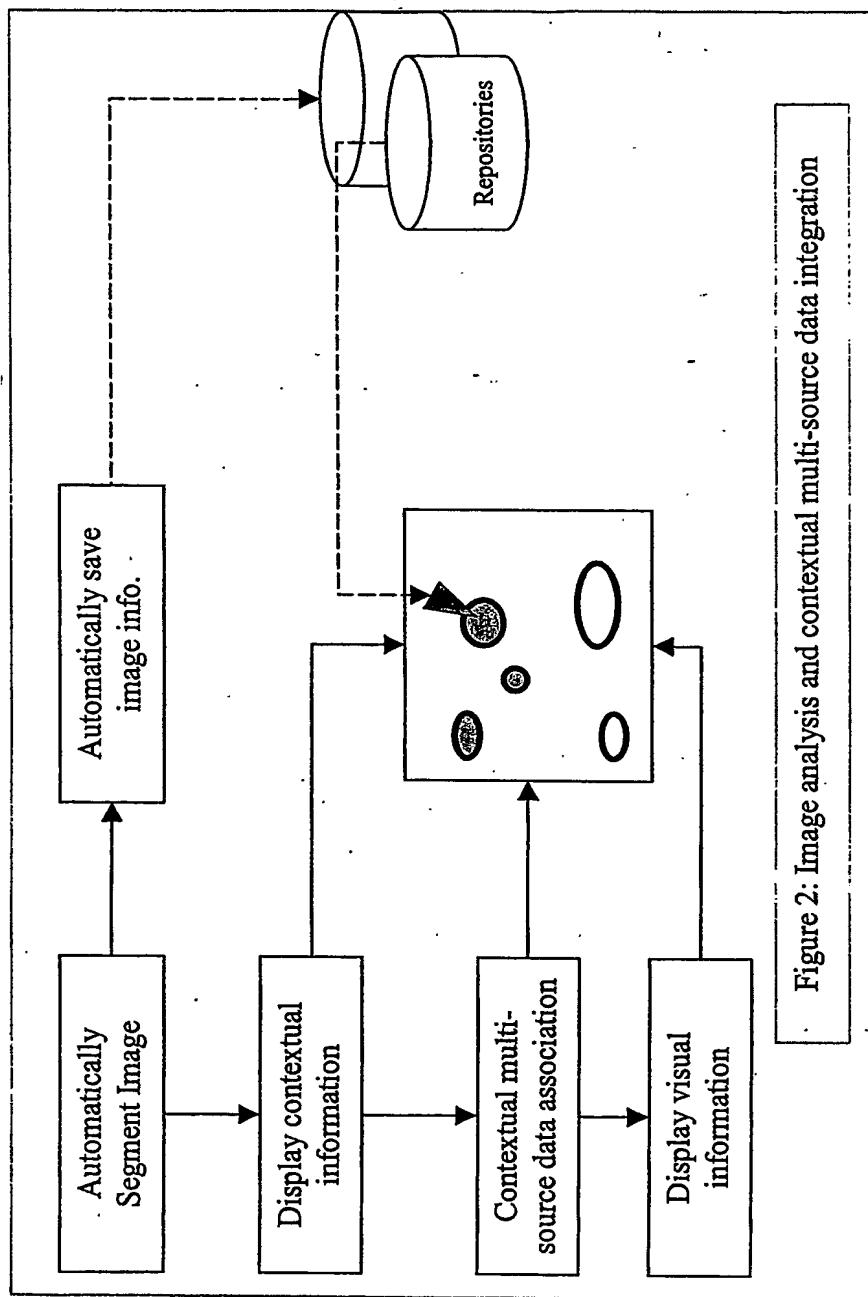


Figure 2: Image analysis and contextual multi-source data integration

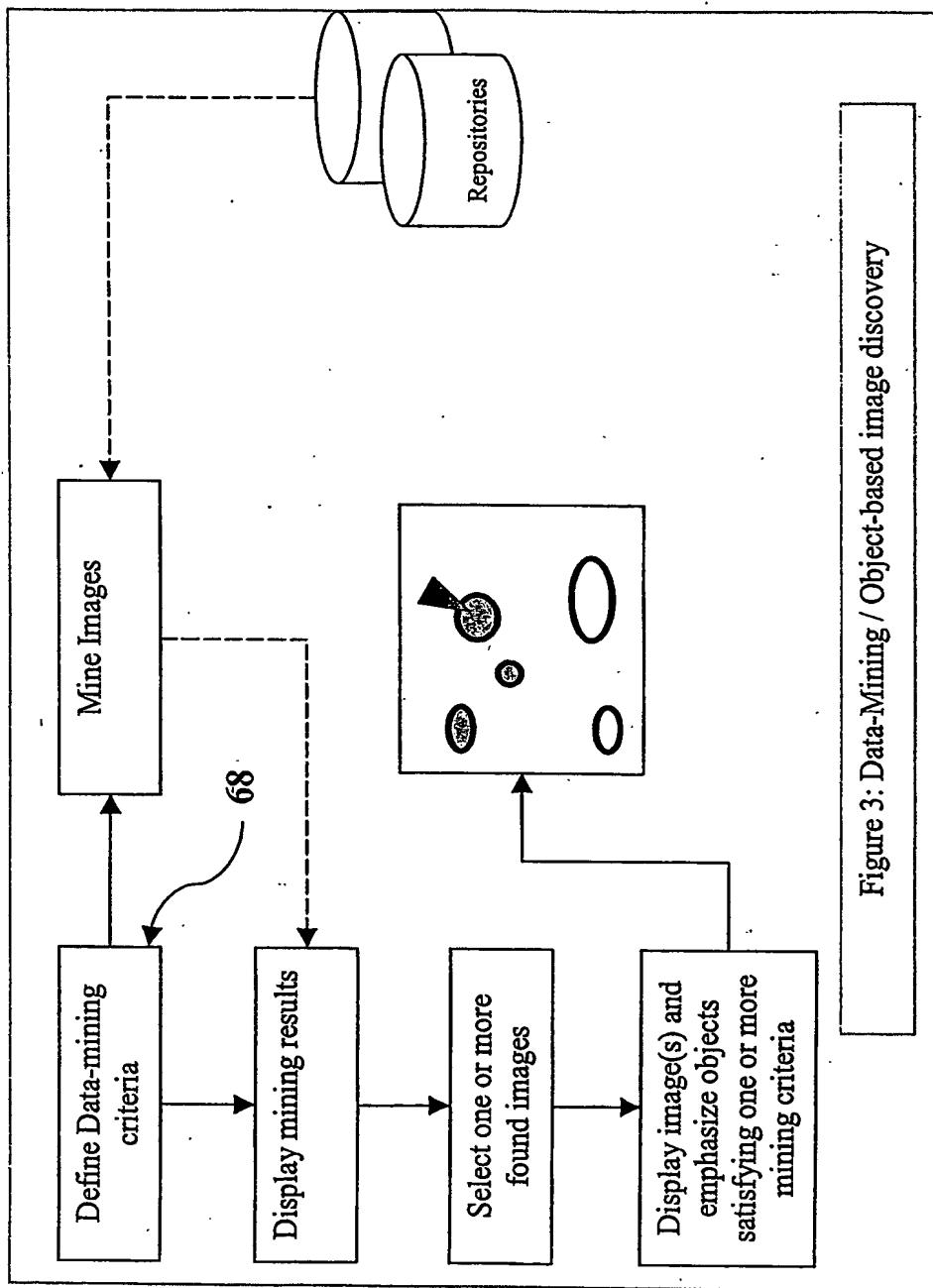
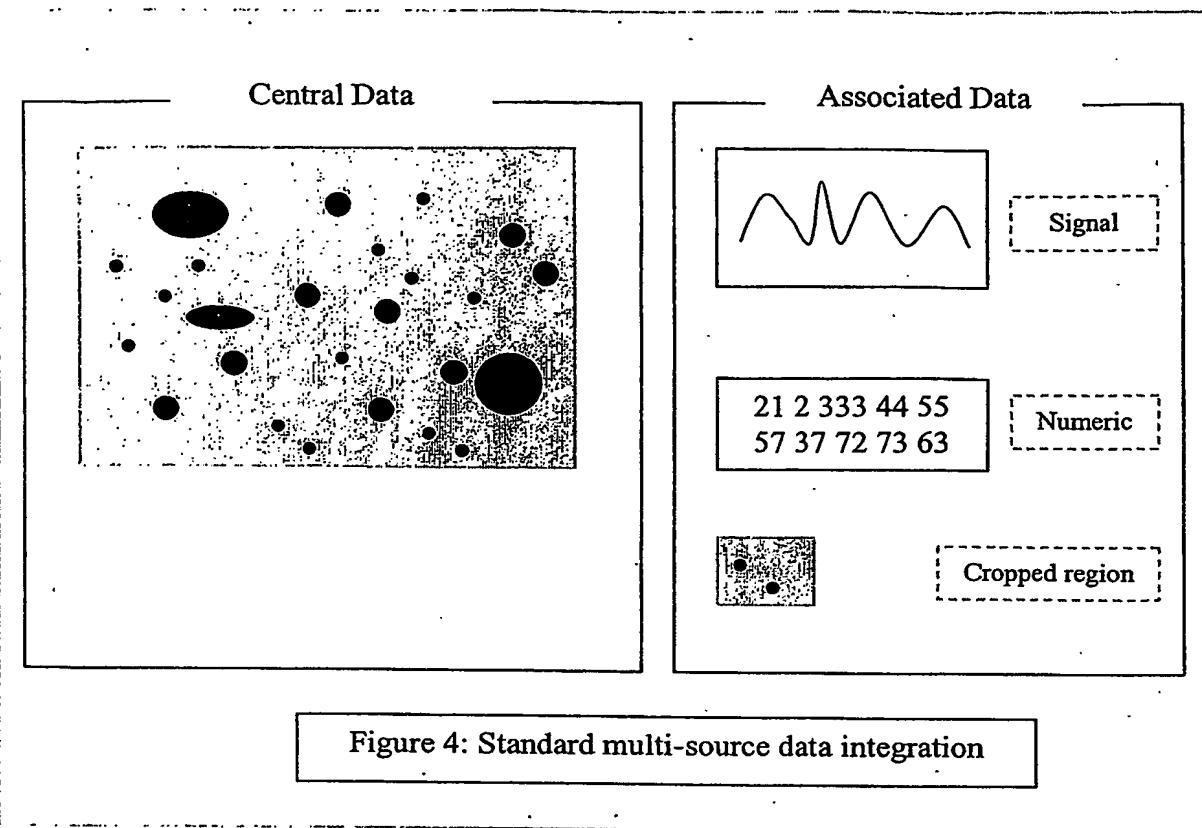


Figure 3: Data-Mining / Object-based image discovery



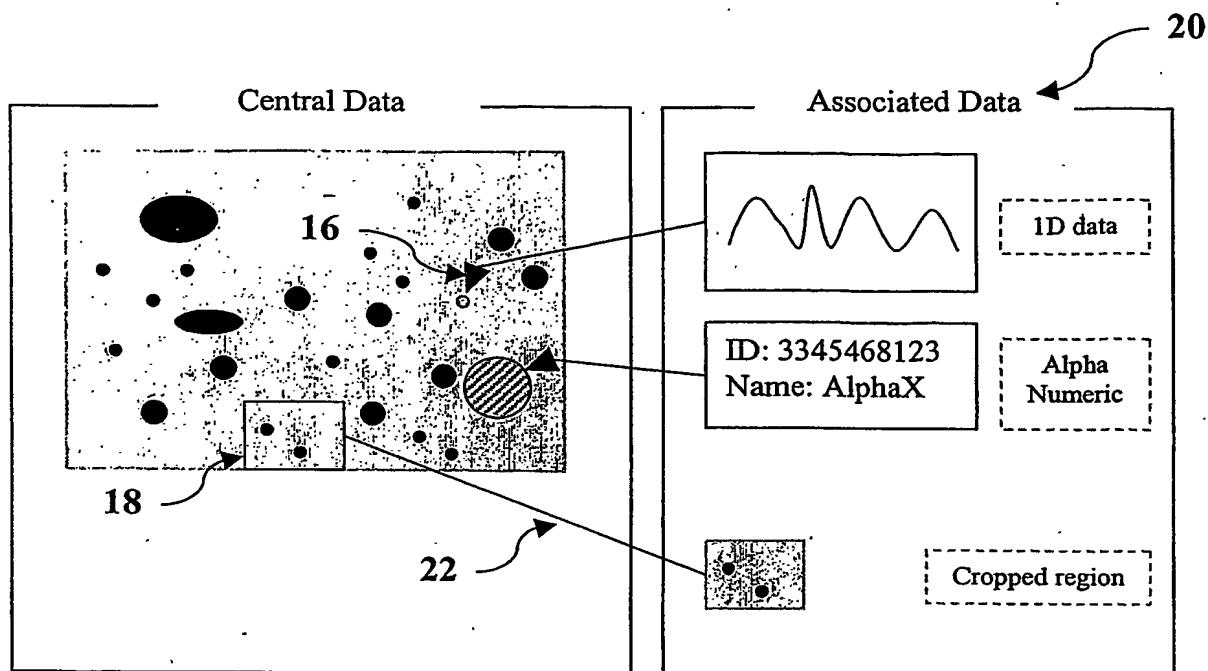


Figure 5: contextual multi-source data integration

Figure 6: Interactive ROI selection

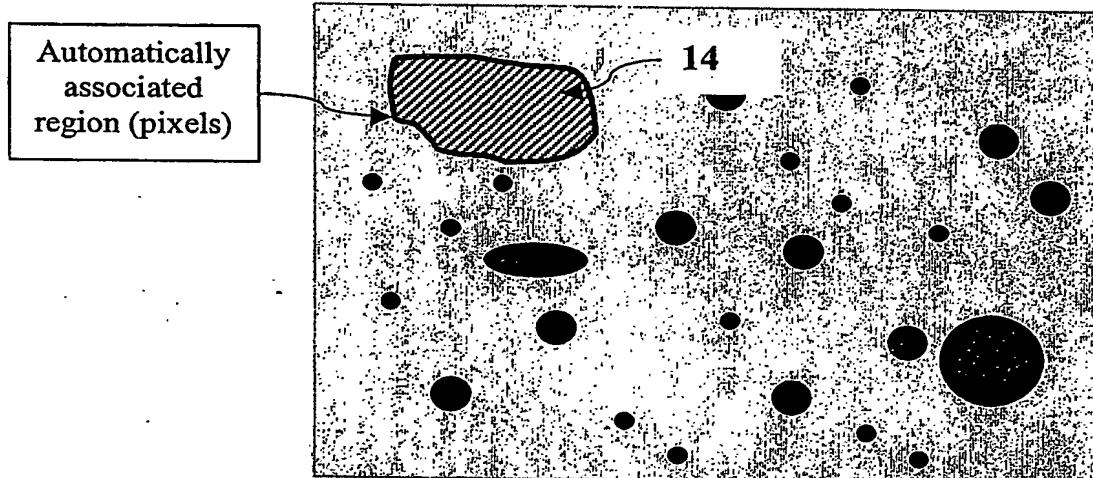
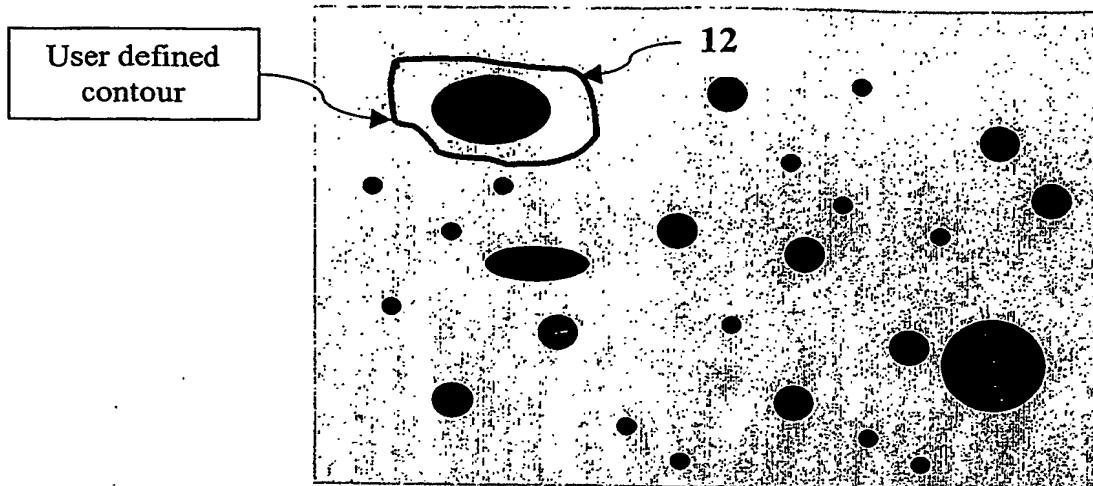
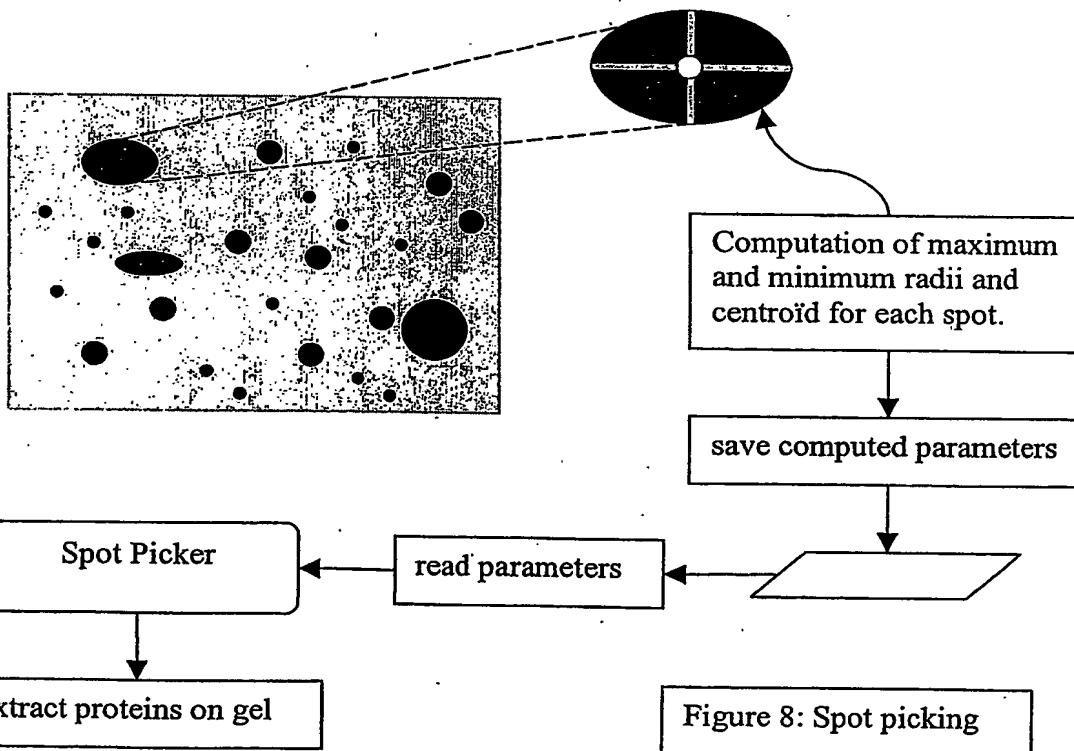
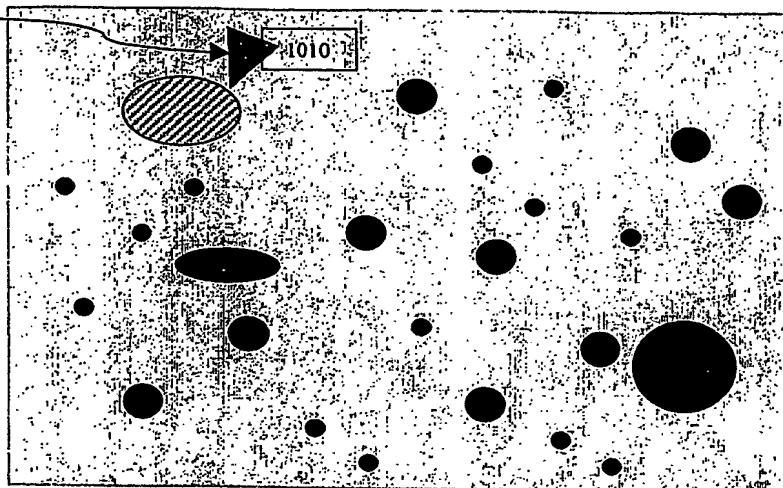


Figure 7: Other visual indication of data association

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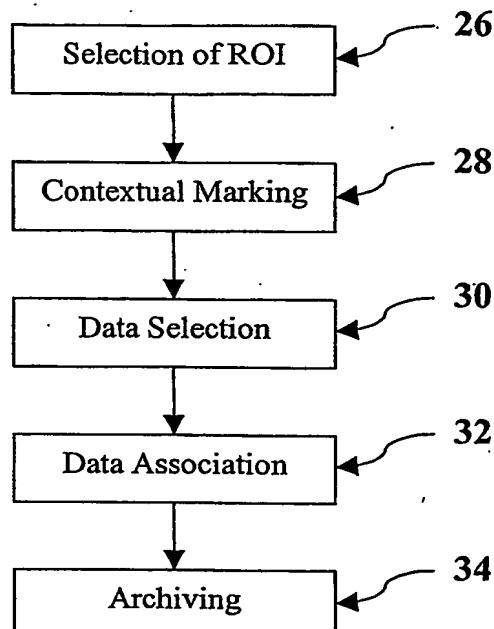


Figure 9: General flow of contextual data association

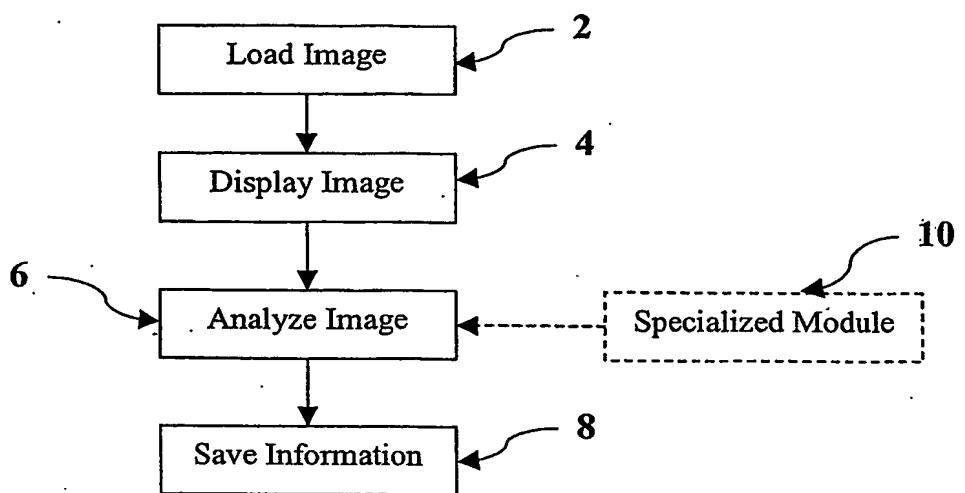


Figure 10: Basic image analysis Operational Flow

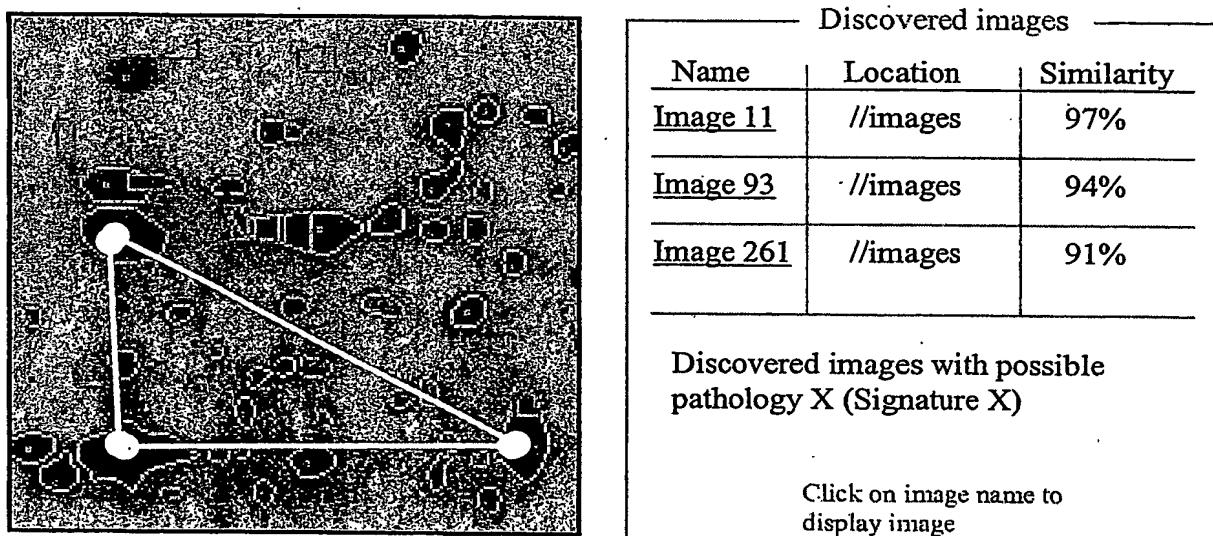


Figure 11: Image data-mining and discovery results display in tabular form

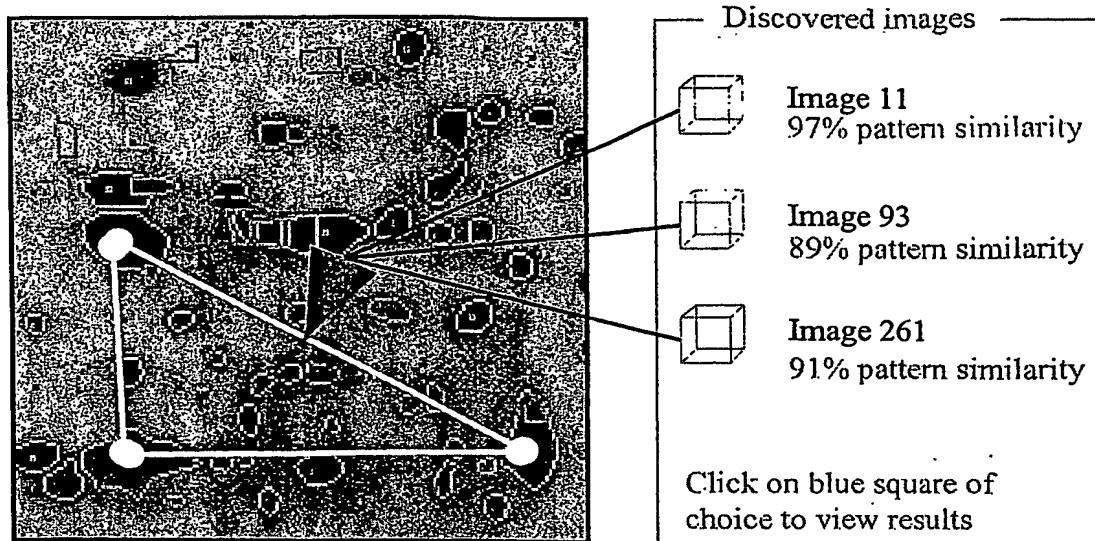


Figure 12: Image data-mining and discovery results display with visual associative links

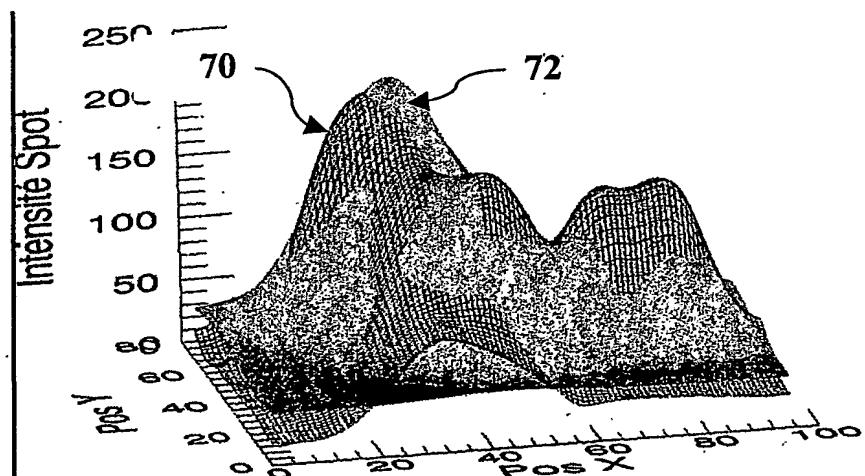


Figure 13: Simulated spots using diffusion functions

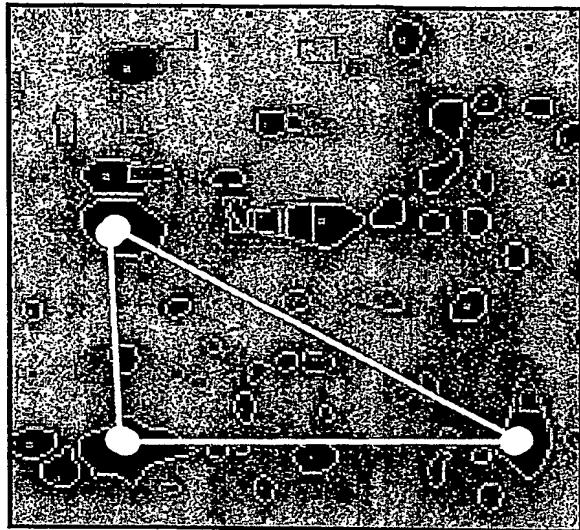


Figure 14: Example of multi-spot (protein) pattern

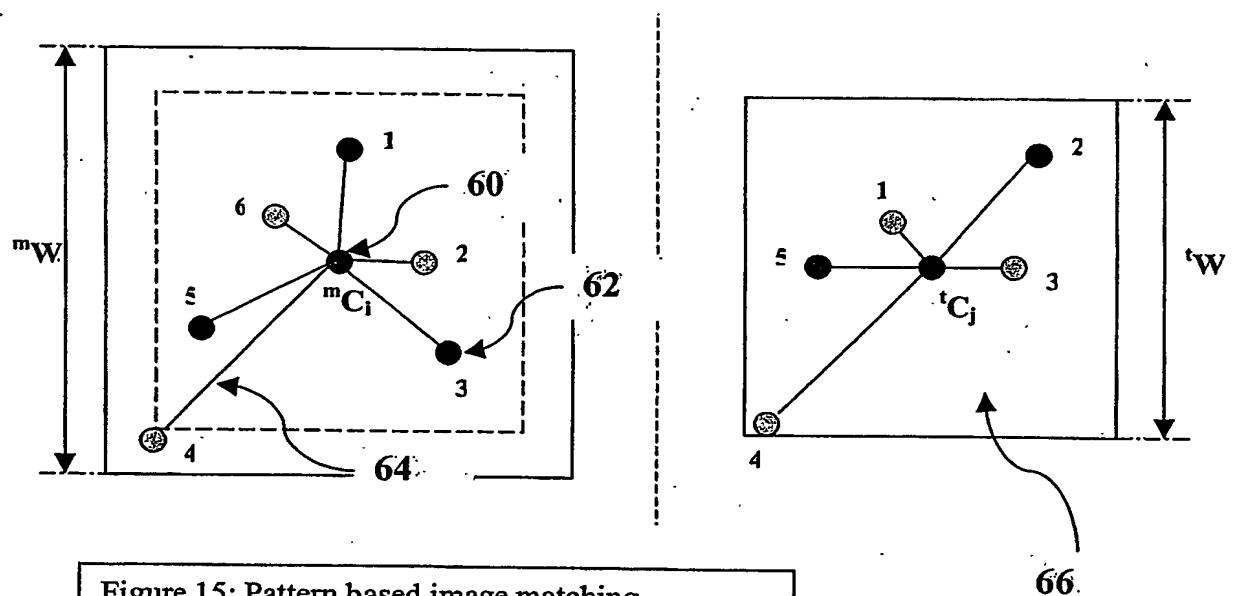


Figure 15: Pattern based image matching

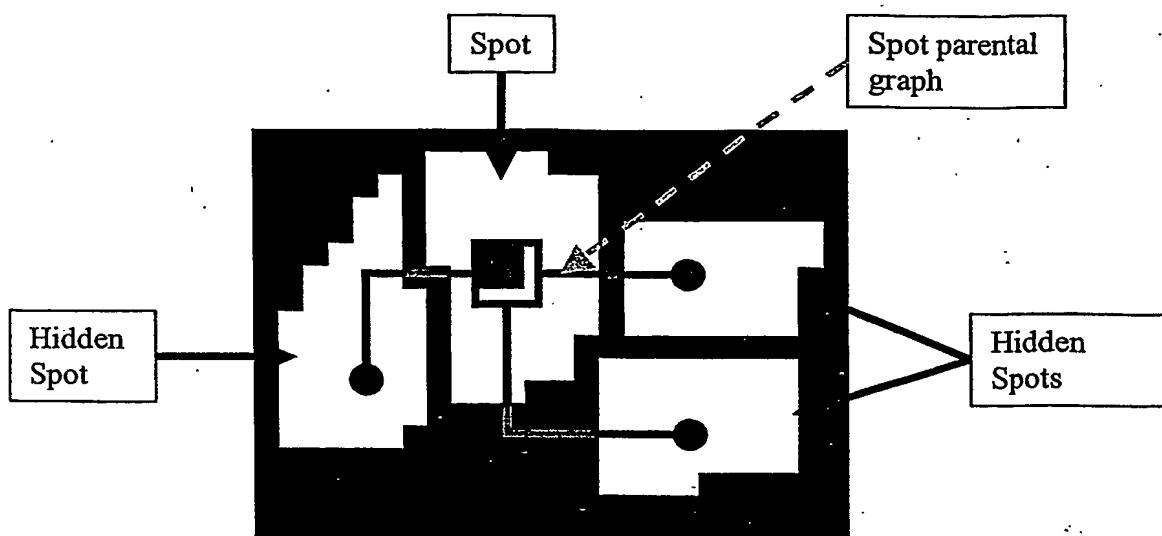


Figure 16: Hidden spot parental graph

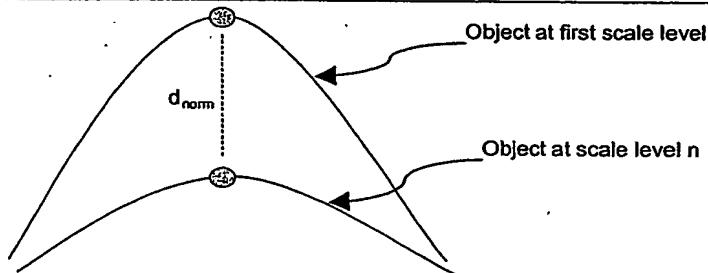


Figure 17 a: Two-scale energy amplitude

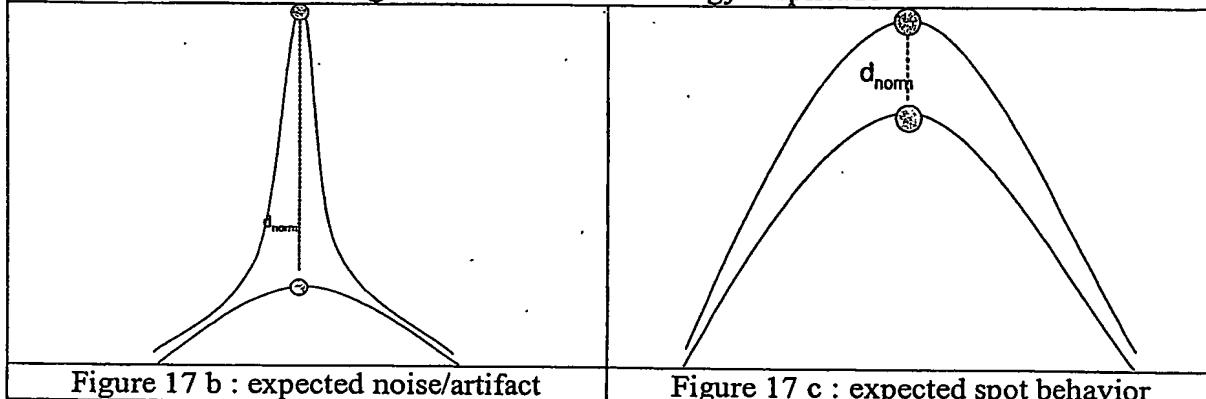


Figure 17 b : expected noise/artifact

Figure 17 c : expected spot behavior

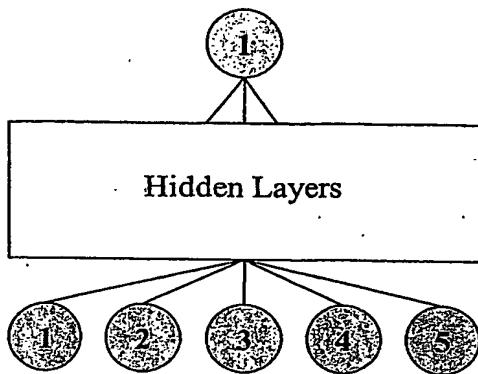
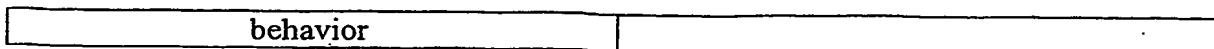


Figure 18: Simple Neural Network classifier

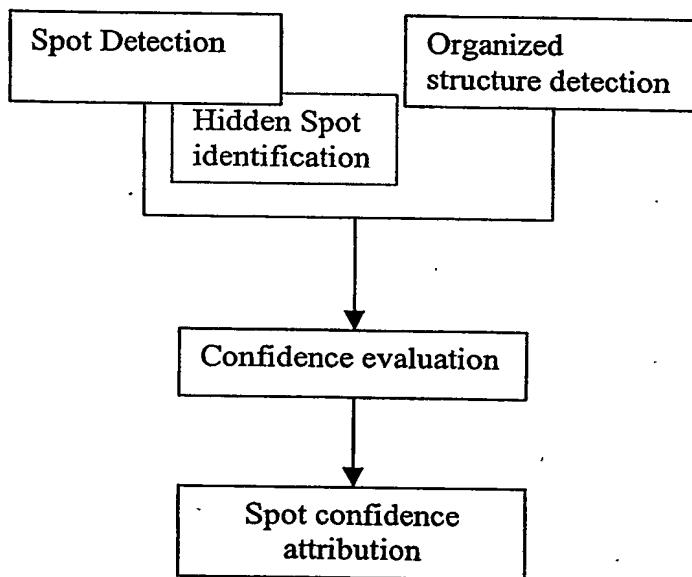
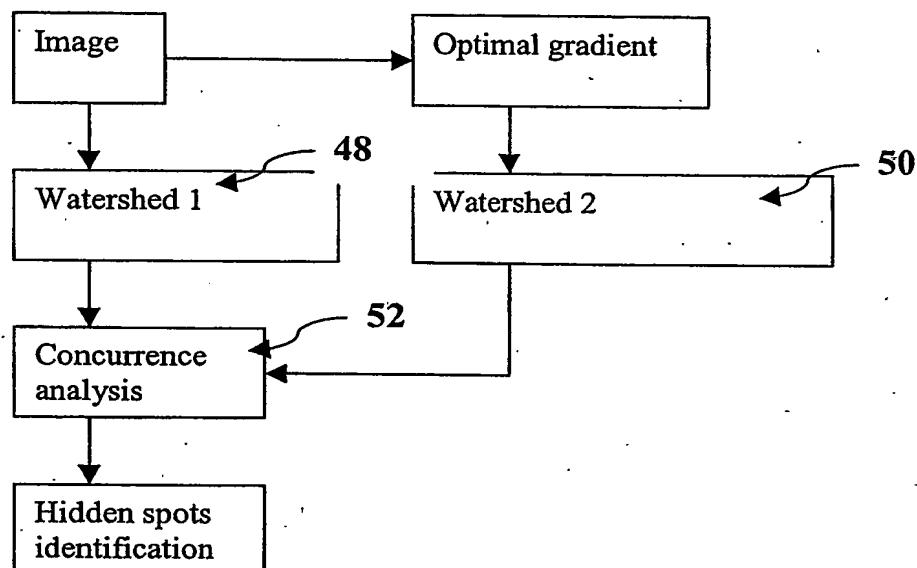
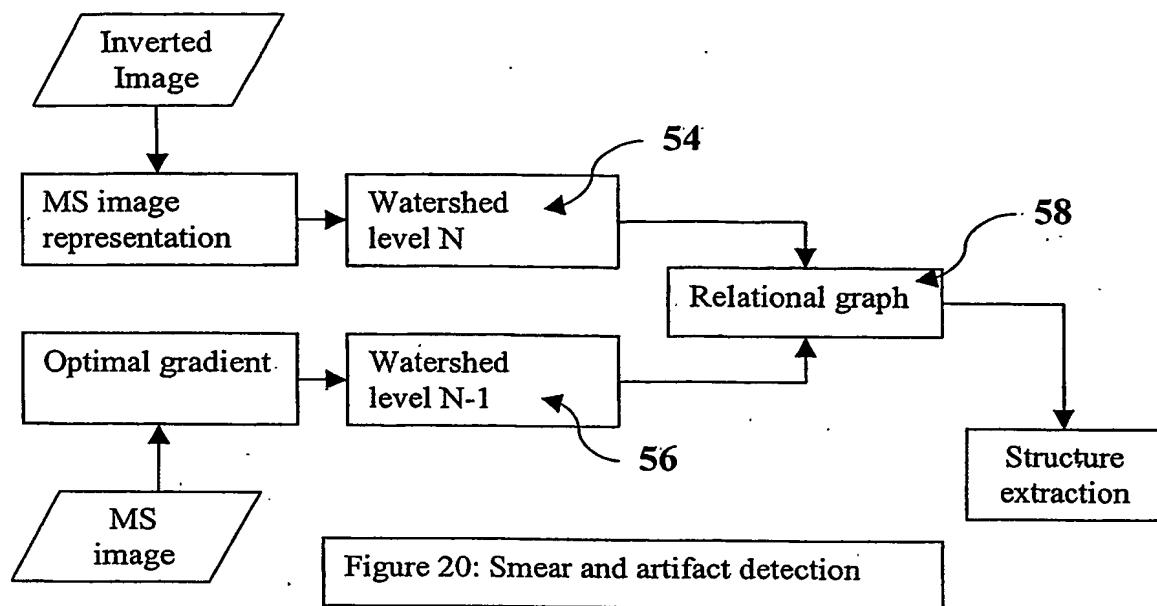


Figure 19: Spot confidence attribution process



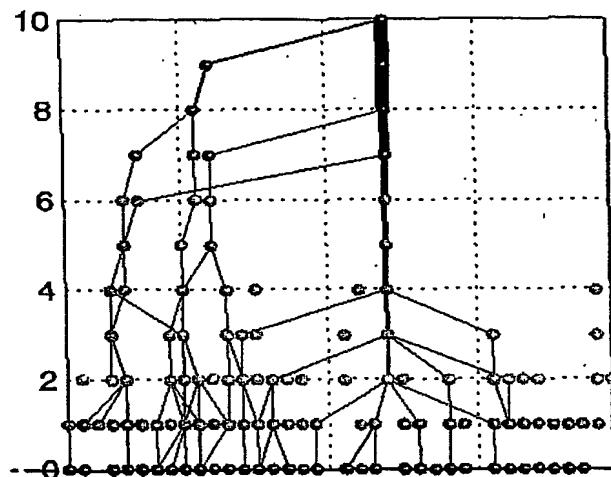
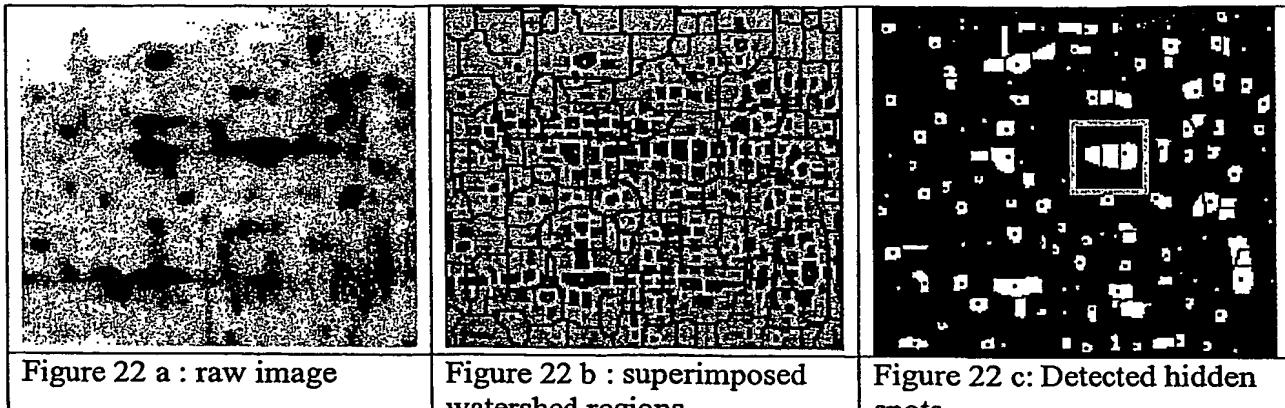


Figure 23: Profile view of Multiscale event tree

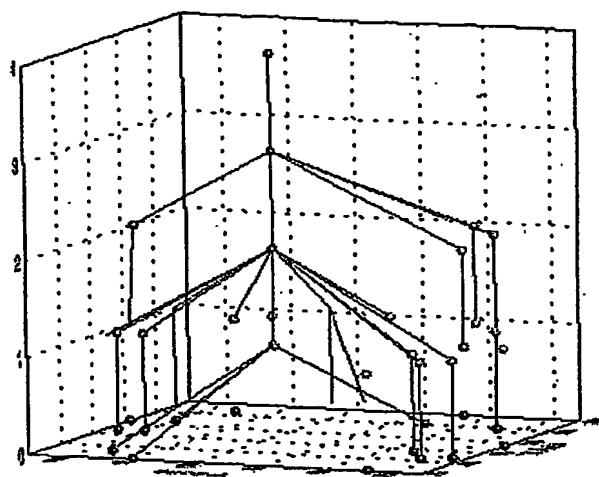


Figure 24: Typical 3D view of multiscale event tree of a spot

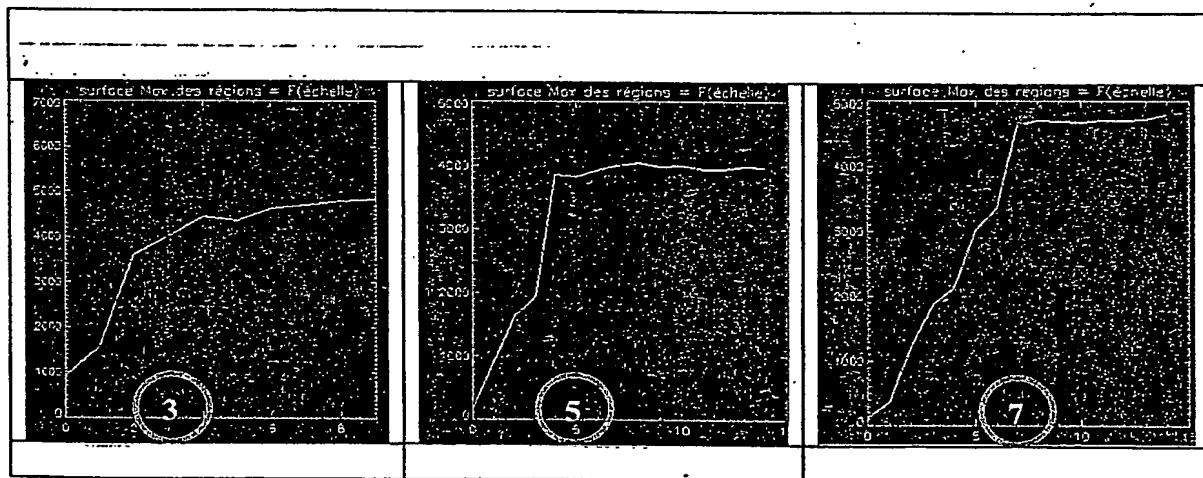
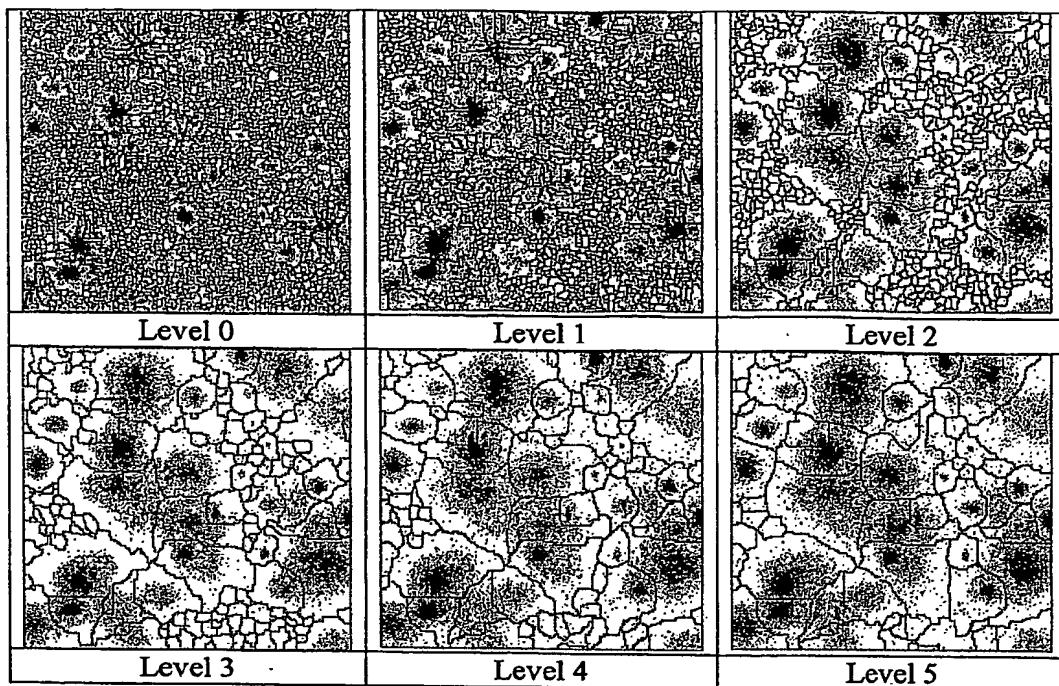
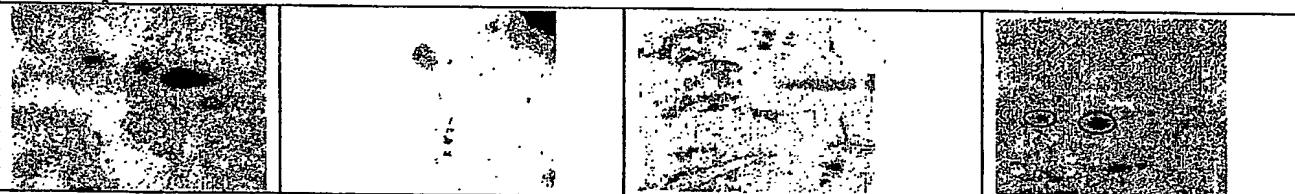


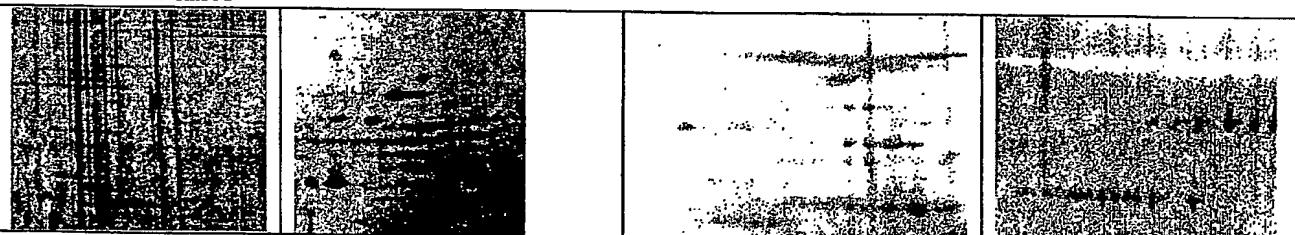
Figure 25 : Watershed regionalization of spot image at multiple scale levels (multiscale image regionalization).



26 a : Spots and artifacts



26 b : Smear lines



26 c : Variable background

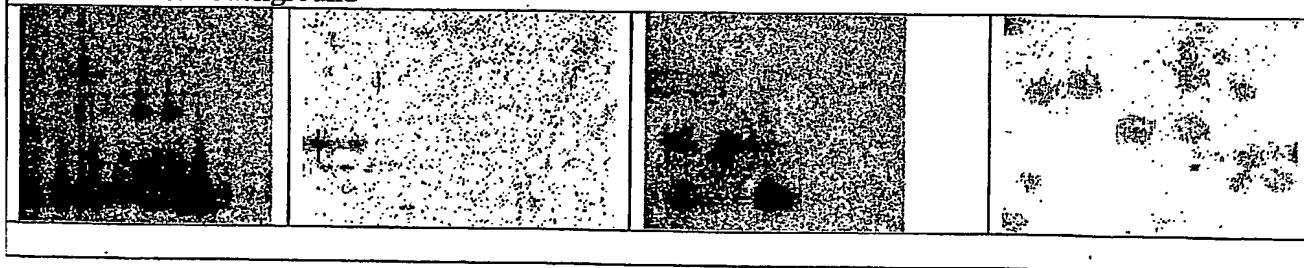


Figure 26 : Typical image variations

Eq. 1 : Poisson distribution

$$P(x) = \frac{\mu^x e^{-\mu}}{x!}$$

Eq. 2 : Gaussian modeled spot

$$G(\vec{x}, S) = \frac{1}{2\pi\sqrt{|S|}} \exp\left[-\frac{1}{2} \vec{x}^T S^{-1} \vec{x}\right], \text{ with } S = \begin{pmatrix} \sigma_x^2 & \rho\sigma_x\sigma_y \\ \rho\sigma_x\sigma_y & \sigma_y^2 \end{pmatrix}, \text{ where rho represents the x,y correlation coefficient.}$$

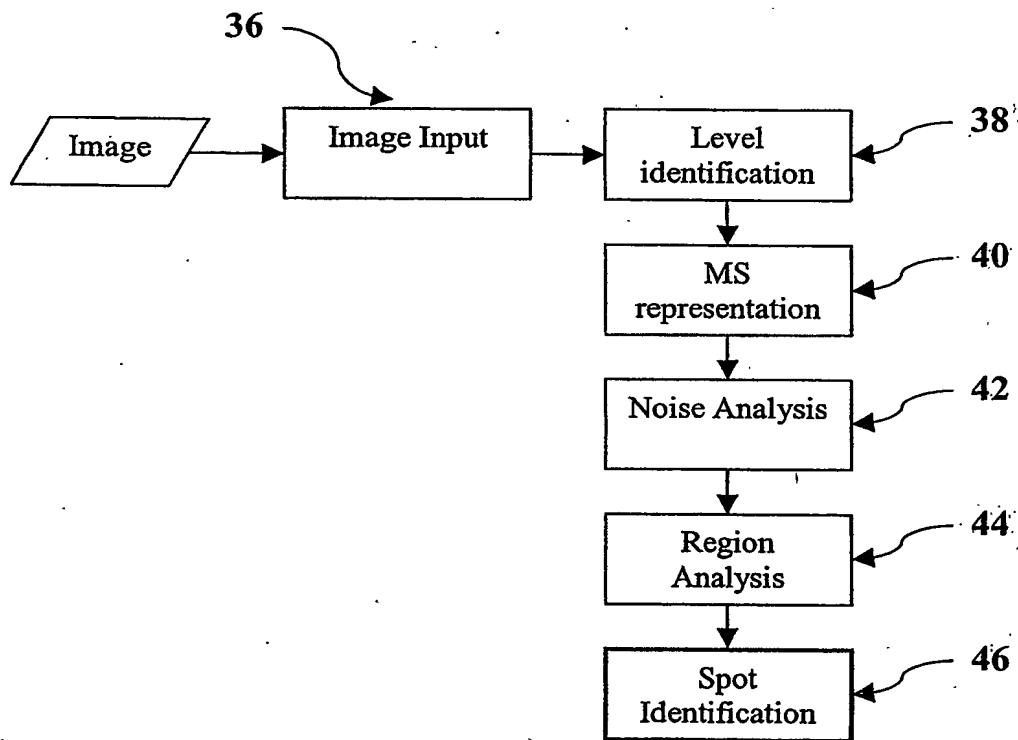


Figure 27: Overall spot identification process